



TITLE:

A New Subspecies of *Longipedia andamanica* Wells from the Pacific Coast of Japan, with Reference to the Morphology of *L. coronata* Claus (Copepoda : Harpacticoida)

AUTHOR(S):

Ito, Tatsunori

CITATION:

Ito, Tatsunori. A New Subspecies of *Longipedia andamanica* Wells from the Pacific Coast of Japan, with Reference to the Morphology of *L. coronata* Claus (Copepoda : Harpacticoida). PUBLICATIONS OF THE SETO MARINE BIOLOGICAL LABORATORY 1985, 30(4-6): 307-324

ISSUE DATE:

1985-12-25

URL:

<http://hdl.handle.net/2433/176107>

RIGHT:

**A New Subspecies of *Longipedia andamanica* Wells from
the Pacific Coast of Japan, with Reference to
the Morphology of *L. coronata* Claus
(Copepoda: Harpacticoida)**

By

Tatsunori Itô

Seto Marine Biological Laboratory, Kyoto University, Shirahama,
Wakayama, 649-22, Japan

With Text-figures 1-10

Abstract A new subspecies of *Longipedia andamanica* Wells, 1980 (Copepoda: Harpacticoida) is described from Shirahama on the Pacific coast of Honshu, Japan, under the name *L. andamanica nipponica*. This new subspecies clearly differs from *L. andamanica andamanica* in the armature of the male leg 5. Comments on the morphology of *L. coronata* Claus, 1863 are also given to clarify some characteristics of the new subspecies.

The present paper deals with a new subspecies of *Longipedia andamanica* Wells, 1980 (Harpacticoida: Longipediidae) from Japan. *L. andamanica* has not been reported from any localities since the original description by Wells (1980) based upon 14 females and one male from the South Andaman Islands in the Bay of Bengal. Hence, no information on the variability of the male is available from the literature, and distribution range of this species still remains uncertain. The males collected from Japan, however, are clearly discernible from Wells' one from the South Andaman Islands. In contrast to the males, it is practically impossible to distinguish between the females of these two localities. As a tentative solution to signify both similarity and dissimilarity between the materials from two remote localities, I designate this Japanese material as a new subspecies of *L. andamanica* and give it a full description, hoping further comparative studies based upon enough materials from various localities will follow this.

Specimens were collected from detritus-rich coarse sand deposited in a tide pool located on Bansho Point near the Seto Marine Biological Laboratory at Shirahama (33°42'N, 135°21'E) on the Pacific coast of southern Honshu, Japan. The specimens dissected in glycerin were mounted onto slide glasses with Gum-chloral Medium. The type-series is deposited in the Seto Marine Biological Laboratory, Kyoto University. This work is supported by Grant-in-Aid for Scientific Research, No. 58540482, from the Ministry of Education, Science and Culture, Japan.

***Longipedia andamanica nipponica* subsp. nov.**

Type-series. Holotype: adult male (30-X-1972, Itô leg.). Paratypes: 2 adult females (30-X-

1972, Itô *leg.*), one of which is designated as the allotype, and 1 adult male (23-VIII-1983, Itô *leg.*). Type locality: Shirahama, Wakayama Pref., Japan.

Female (allotype). Body (Fig. 1-A, B), rostrum and furcal setae excluded, 0.95 mm long, semitransparent and faintly tintured with brown. Nauplius eye big (see Discussion). Rostrum (Fig. 1-C) 1.07 times as long as its basal width, of a bell-shaped outline (see Discussion). Cephalothoracic integument fringed with long hair-like spinules as well as short spinules anteriorly (Fig. 1-C) and fringed with short

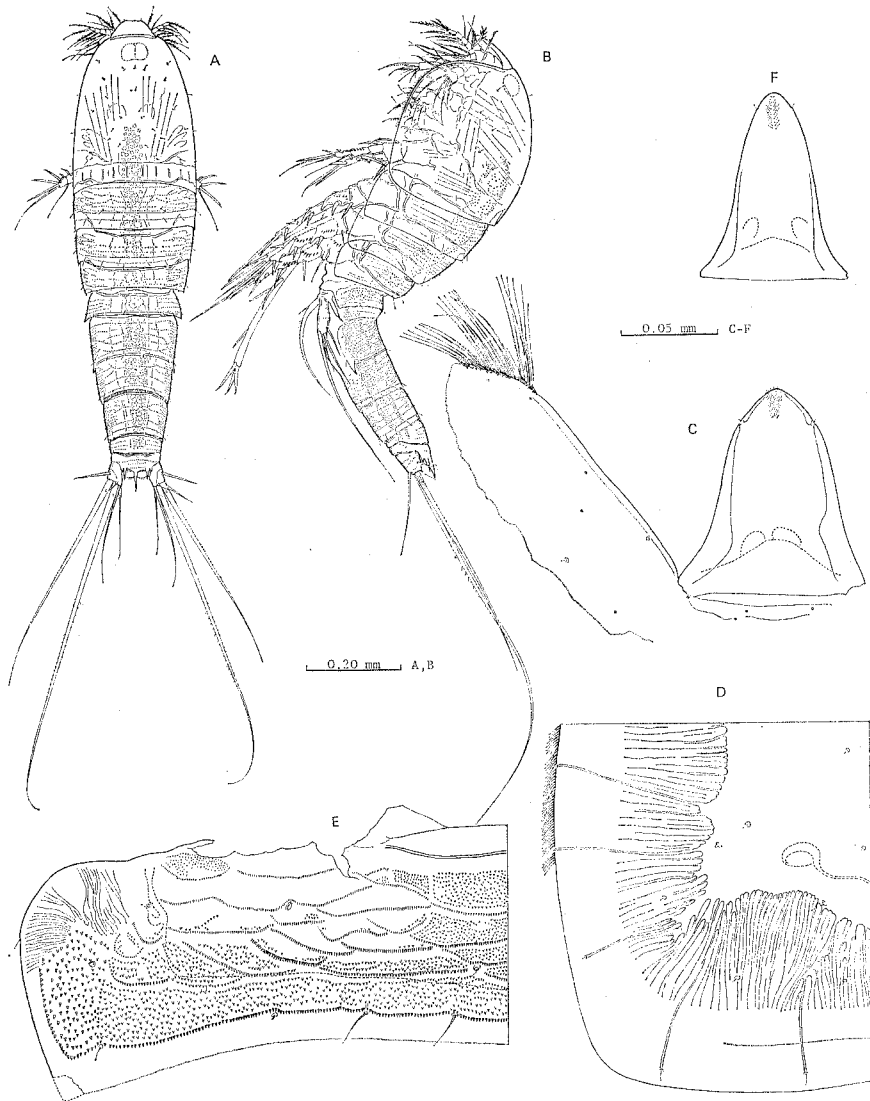


Fig. 1. *Longipedia andamanica nipponica* subsp. nov., allotype female. A. Habitus, dorsal; B. Habitus, lateral; C. Rostrum and an anterior portion of cephalothoracic integument; D. Integument of cephalothorax; E. Pleurotergite of first thoracic somite. *Longipedia coronata* from Banyuls-sur-Mer, female. F. Rostrum.

spinules ventrally (Fig. 1-D), ornamented with sensory hairs on its surface but with no scattered spinules. Each pleurotergite of thoracic somites (Figs 1-E, 2-A, B, C) ornamented with spinular rows and scattered spinules. Abdomen (Figs 2-D, E; 3-A) ornamented with transverse rows of diminutive spinules and a number of scattered spinules as illustrated (see also the description of the male). Genital double-somite armed with a pair of spur-shaped processes which are well developed and accompanied with a long sensory hair near each ventral base; fused somites dorsally

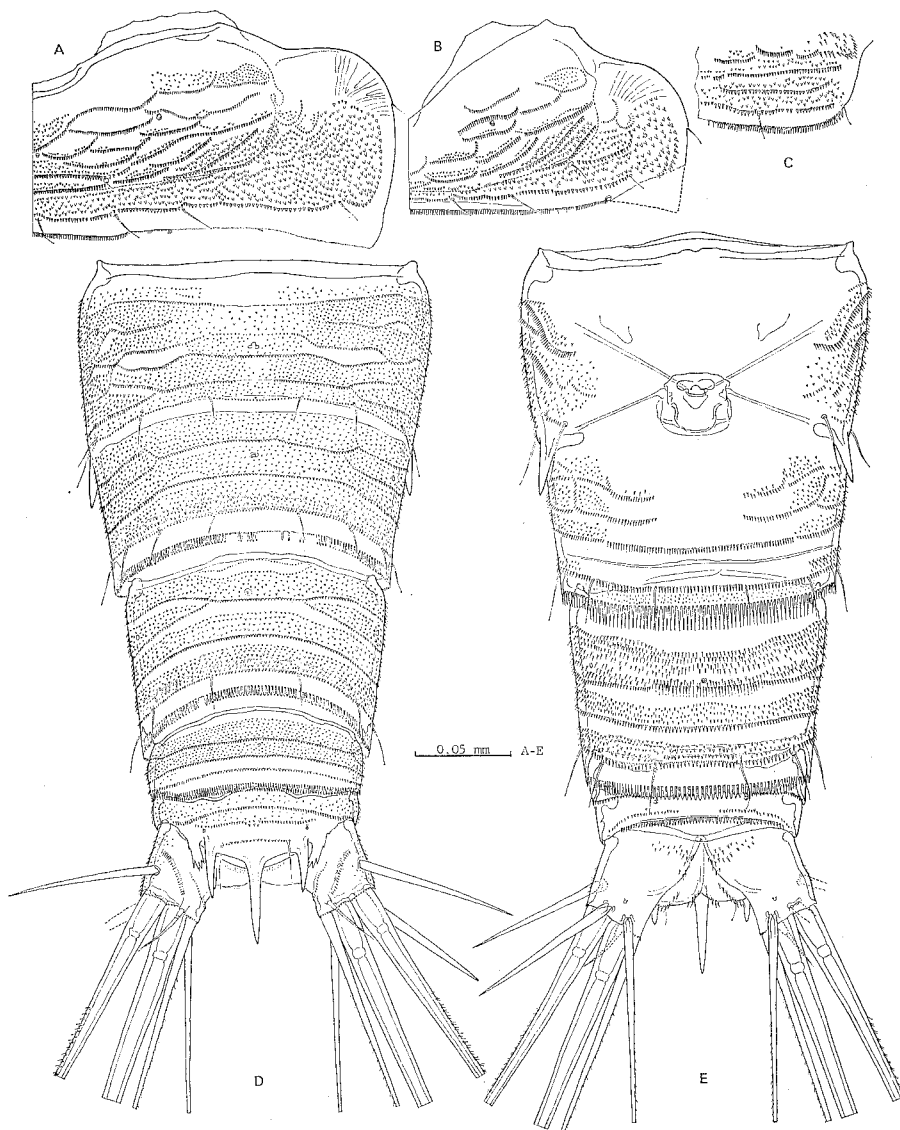


Fig. 2. *Longipedia andamanica nipponica* subsp. nov., allotype female. A-C. Pleurotergites of second, third, and fourth thoracic somites; D. Abdomen, dorsal; E. Abdomen, ventral.

demarcated from each other by a transverse chitinous suture accompanied with a row of sensory hairs; ventral surface around genital area almost bare (Fig. 2-E); hyaline frill markedly serrate, and its ventral teeth, which are very sharp, more than twice as long as dorsal teeth which are not sharp; a circumambient row of spaced hairs placed along the base of hyaline frill. Antepenultimate somite: scattered spinules on ventral surface a little longer than those on dorsal surface; hyaline frill serrate as in the preceding somite, but ventral teeth not so long, not sharp; a circumambient row of spaced hairs along the base of hyaline frill. Penultimate somite short, about 0.5 times as long as the preceding somite, with no hair; hyaline frill consisting of short and narrow teeth. Anal somite ornamented with three transverse rows of spinules dorsally, of which the first (anterior) is stretched wide, the second is placed between two small secretory pores and interrupted by scattered spinules medially, and the third is placed between two long hairs arising near base of each internal process (explained below) of anal operculum; a transverse row of spinules attached onto ventral face close to furcal rami; anal operculum armed with five processes, i.e., one median, a pair of internal and a pair of external processes—the median process narrow and extending beyond the distal end of furcal ramus, the internal processes about half as long as the median one, the external processes shorter than the internal ones and markedly polyfid, the space between the median process and the internal processes very wide. Furcal ramus a little longer than wide when viewed from ventral, ornamented with a prominent row of spinules on dorsal face, which arises from the base of a geniculate inner dorsal seta and extends anteriorly and outwards; setae and spines as illustrated.

Antennule (Fig. 3-B) consisting of five segments; third segment armed with two aesthetascs anteriorly; fifth segment about as long as two preceding segments combined, armed with two juxtaposed aesthetascs of a peculiar form apically (see Fig. 3-C); setae and spines as illustrated. **Antenna** (Fig. 3-D). Coxa, basis, and first endopodite segment not fused. Coxa represented by a very short segment with no ornamentation. Basis a little thickening distally. First endopodite segment as long as apical two endopodite segments combined, armed with two spinulose setae on its subapical anterior face, ornamented with a row of numerous delicate spinules anteriorly. Second endopodite segment very short, anteriorly armed with five spinulose setae in all (see Discussion). Third endopodite segment armed apically with five spiniform setae which bear spinules unilaterally, a short seta with some short spinules bilaterally, and a slender seta which is naked. Exopodite consisting of eight segments, of which the proximal two (Fig. 3-E) are very short and without serrate distal edge; first segment armed with a bare setula; second segment armed with a short seta which bears a few hairs bilaterally (see Discussion); apical six segments ornamented with a delicately serrate edge together with some spinules, armed with spinulose setae as illustrated. **Mandible** (Fig. 4-A). Precoxa armed with a short spinulose seta on dorsal angle of its cutting edge. Coxa-basis widening medially, ornamented with hairlike spinules along its inner edge and numerous hairs scattered near outer edge; two setae, one of which bears spaced

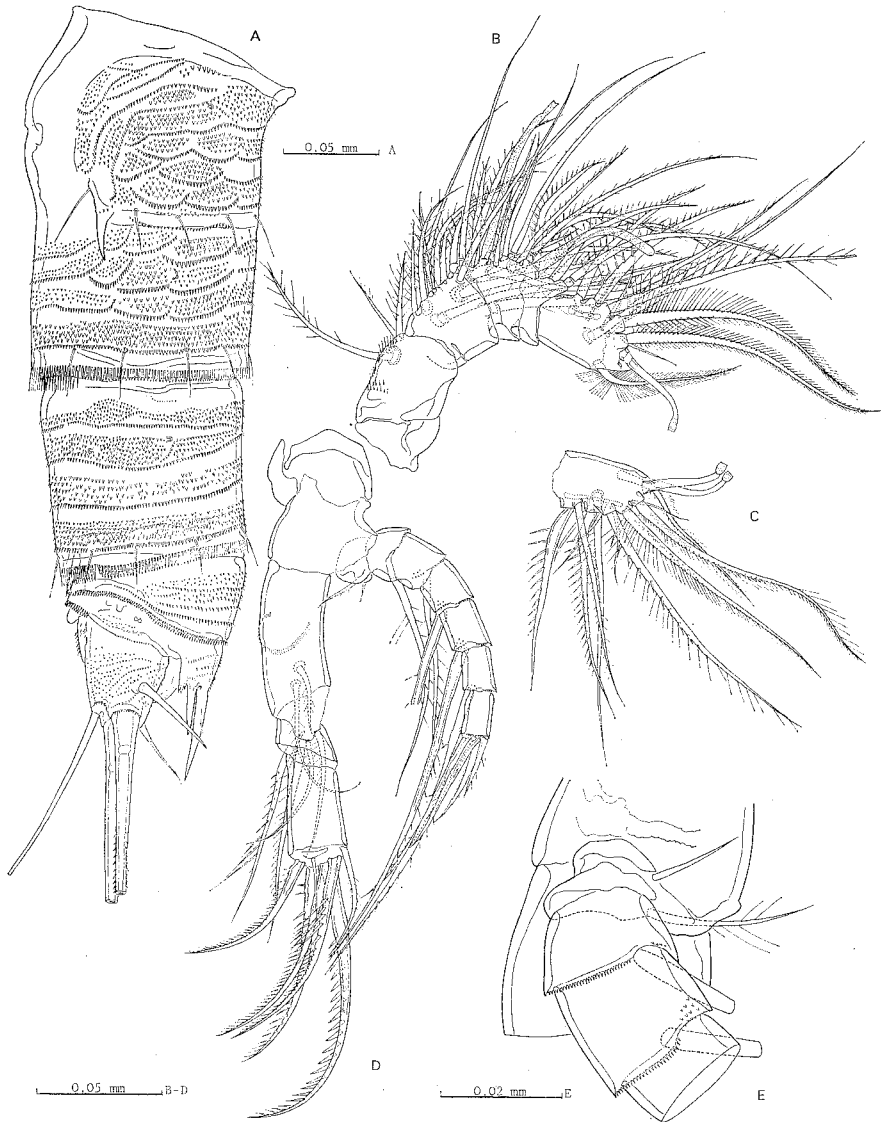


Fig. 3. *Longipedia andamanica nipponica* subsp. nov., allotype female. A. Abdomen, lateral; B. Antennule; C. Apical segment of antennule; D. Antenna; E. Proximal segments of antennal exopodite.

hairlike spinules unilaterally, arising from subapical inner edge (see Fig. 4-G). Endopodite consisting of two segments; first segment about twice as long as second segment, armed with one seta on subapical inner edge and two closely set setae on outer distal edge—these three setae ornamented with hairlike spinules sparsely; second segment armed with six apical and subapical spinulose setae in all, one of which bears long hairlike spinules unilaterally. Exopodite consisting of three (?) segments; first segment short, armed with two inner setae; second segment with an

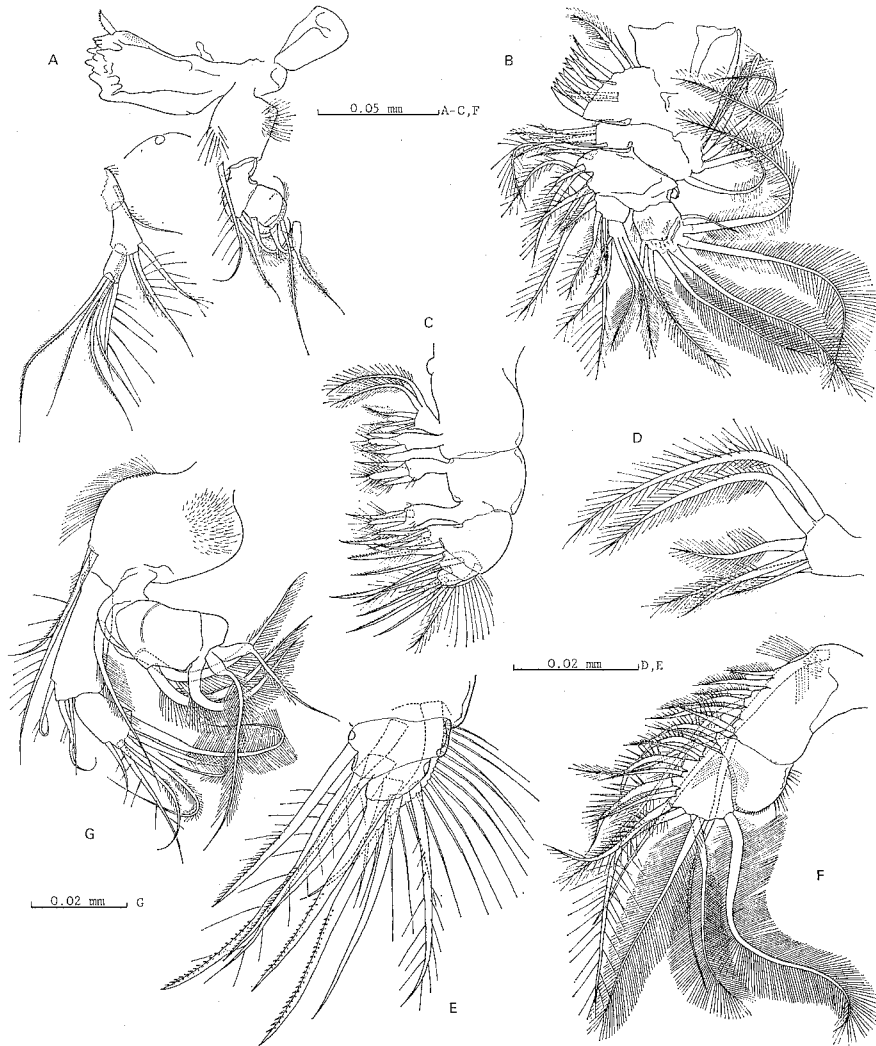


Fig. 4. *Longipedia andamanica nipponica* subsp. nov., A-F, allotype female; G, holotype male. A. Mandible; B. Maxillula; C. Maxilla; D. Proximal endite of maxilla; E. Endopodite of maxilla; F. Maxillipede; G. Mandible (precoxa omitted).

indistinct suture, armed with one inner seta medially; third segment very short, armed with one inner seta and two juxtaposed apical setae whose basal portion is thick; all setae plumose. Maxillula (Fig. 4-B). Arthrite of precoxa armed with one bare setula and one thick spinulose seta on dorsal edge, nine spines along inner edge, a bare spiniform seta on posterior face near inner dorsal angle, two parallel setae on anterior face. Coxa armed with five plumose setae on outer edge; two spinulose spines and three hairy setae arising from inner process. Basis armed with a setula on its outer edge (see Discussion); inner edge bilobular, armed with two sets of two juxtaposed setae on the dorsal lobule and four closely set setae on the ventral lobule; all setae hairy. Endopodite consisting of two short segments;

first segment armed with four spinulose setae on inner edge; second segment armed with two hairy setae on inner distal angle and three plumose setae apically. Exopodite consisting of one segment with six plumose setae and one small seta which arises from outer edge; some spinules scattered on anterior surface. *Maxilla* (Fig. 4-C). Precoxa and coxa well demarcated from each other. Precoxa furnished with two closely set endites; first (dorsal) endite armed with two long setae which are plumose, and four short hairy setae (see Fig. 4-D and Discussion); second endite armed with three spinulose short setae. Coxa furnished with two widely spaced endites, each armed with three short setae which are spinulose. Basis with a round outer edge, forming inwards a strong claw accompanied with one spine and four setae around its base; two setae, one of which bears long hairs unilaterally and the other bears hairs bilaterally, arising from distal edge close to the base of endopodite. Endopodite consisting of two short segments; first segment armed with three spiniform setae, which are spinulose; second segment armed with two spiniform setae, which are spinulose, and two setae, of which the outer one bears hairs bilaterally. *Maxilliped* (Fig. 4-F). Precoxa fused with coxa, armed with a big plumose seta (plumes omitted in the figure). Coxa armed with six spinulose short setae on inner edge, the fourth (counted from dorsal) seta accompanied with a long hairy seta; two long hairy setae arising from inner distal angle. Basis ornamented with spinules on outer edge and a row of short spinules along distal edge; a thick seta arising from a short inner process, which is accompanied with a slender seta on its ventral base; both setae spinulose. Endopodite armed with six spinulose setae on inner edge—the first, third, and fifth setae thicker than the others and arising from a short process in each; a spinulose seta arising from an apical process; a long seta, which bears four rows (not bilateral) of long hairlike spinules, arising from subapical outer edge; three long setae on outer edge, all plumose.

Leg 1 (Fig. 5-A). Intercoxal plate wide and low, with no spinule. Coxa ornamented with a spiniform projection (indicated by arrow in the figure: See Discussion) which is placed just below a short row of spinules on posterior face near proximal outer angle; inner edge with no spinules; inner seta ornamented with a row of numerous short spinules along its distal half. Basis fringed with numerous soft hairs on outer edge; outer seta not extending beyond first endopodite segment; inner spine reaching the middle of second endopodite segment. Exopodite: inner seta of first segment not extending beyond second exopodite segment. Endopodite: inner seta of second segment well-developed, extending beyond third endopodite segment, plumose. Other setae and spines as illustrated. *Leg 2* (Fig. 5-B). Intercoxal plate concave, with a number of scattered spinules anteriorly. Coxa ornamented with a spiniform projection just below a short row of spinules on posterior face near outer edge as in leg 1; a pore on anterior face near inner edge, where no spine occurs. Each posterior face of coxa and basis bears diminutive spinules (not illustrated) scattered on its outer half. Exopodite: a secretory pore placed on anterior face of first segment near tip of its spiniform outer distal part; inner edge of second segment fringed with long hairs densely; some hairs attached to inner edge of first segment



Fig. 5. *Longipedia andamanica nipponica* subsp. nov., allotype female. A. Leg 1 (spiniform projection of coxa indicated by an arrow); B. Leg 2; C. Leg 3.

and proximal half of inner edge of third segment; diminutive spinules scattered on anterior face of each segment; posterior face of each segment ornamented with diminutive spinules which are scattered wide; setae and spines as illustrated. First endopodite segment: a stout unguiform process arising from inner distal angle of anterior face; a secretory pore on anterior face near distal end; an oblique row of

narrow and sharp spinules attached to anterior face; a number of diminutive spinules scattered on anterior face distal to the oblique row of spinules described above; an arched row of diminutive spinules placed just above the oblique row of spinules, and numerous diminutive spinules scattered above this arched row of spinules; a number of diminutive spinules scattered on proximal two-thirds of posterior surface; inner seta plumose. Second endopodite segment: a longitudinal band of diminutive spinules inserted between two areas of scattered diminutive spinules on anterior surface; a short hair (? setula: see Remarks) arising from almost the center of posterior face; diminutive spinules scattered on posterior face along outer edge. Third endopodite segment: 2.8 times as long as proximal two endopodite segments combined; outer spine, which is twice as long as first inner spine, arising from a point at proximal two-fifths the length of outer margin; chitinous rim of outer edge interrupted at a point of proximal three-fifths the length and at a subapical portion; first inner spine arising from about the middle of inner edge; second inner spine a little longer than first inner spine, arising from a point at proximal three-quarters the length of anterior face near inner edge, and directed outwards; apical and subapical three spines finely serrate; no spiniform process attached onto apical edge; diminutive spinules scattered on whole of anterior surface and on posterior surface near outer edge. Leg 3 (Fig. 5-C). Intercoxal plate scarcely concave along free edge, ornamented with a few rough rows of diminutive spinules on anterior face, a row of corniform protuberances (illustrated) on posterior face along free edge and two transverse rows of corniform protuberances (not illustrated) on posterior face. Coxa armed with a spiniform projection and a short transverse row of spinules on its posterior face near outer edge; a pore placed near base of inner spine which is stout and very finely serrate; posterior apical edge fringed with a row of spinules along its inner half. Second exopodite segment ornamented with a longitudinal row of spinules on anterior face near its inner edge, which is fringed with long hairs densely. Coxa, basis, and both rami ornamented with diminutive spinules scattered on each posterior face. Spines and setae of both rami as illustrated. Leg 4 (Fig. 6-A). Intercoxal plate smaller than that of leg 3, with two transverse rows of diminutive spinules on anterior face, a row of corniform protuberances along free edge, and three rows of corniform protuberances (not illustrated) on posterior surface. Coxa armed with a spiniform projection and a short transverse row of spinules on posterior face as in leg 3; inner spine accompanied with a pore near its base as in leg 3. Outer seta of basis arising from a short cylindrical process on distal edge of posterior face. Inner seta of first exopodite segment rudimentary, arising from subapical inner edge (not from posterior face). Second exopodite segment ornamented with a longitudinal row of spinules on its anterior face as in leg 3, armed with a spiniform seta on subapical inner edge; an inner seta arising from subapical edge, bearing hairs sparsely. First endopodite segment: inner seta spiniform, arising from almost the middle of inner edge; an oblique row of very fine and long spinules on outer half of anterior face. Second endopodite segment: a dwarf seta arising from a point at proximal two-thirds the length of posterior face near inner edge, directed outwards; a spiniform seta

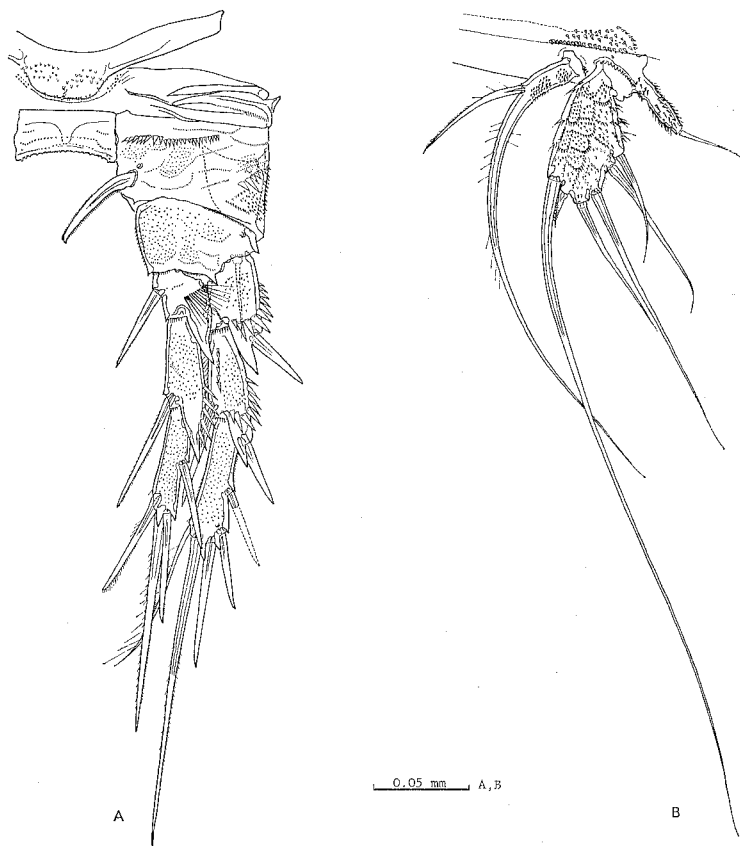


Fig. 6. *Longipedia andamanica nipponica* subsp. nov., allotype female. A. Leg 4; B. Leg 5.

arising from inner distal angle. Third endopodite segment; outer spine arising from a clearly stepped edge at the middle of outer margin; an outer terminal spine and an inner terminal seta, which is spiniform, arising from apical edge, the inner is twice as long as the outer; a spiniform seta attached to subapical inner edge, about as long as the outer terminal spine; a short hair arising from posterior face near the middle of inner edge. Coxa, basis, and both rami ornamented with diminutive spinules scattered on each posterior face. Leg 5 (Fig. 6-B). Basal segments of two legs represented by a common plate; each outer seta arising from a spinulose cylindrical process. Exopodite twice as long as its greatest width, ornamented with arched rows of spinules and scattered spinules on anterior face, a few arched rows of diminutive spinules on proximal half of posterior face (not illustrated), armed with two inner, one terminal, and three outer setae in all; first inner seta arising from a clearly stepped edge, elongate, five times as long as this exopodite segment, with some spinules basally; second inner seta short; terminal seta as long as this exopodite segment; third (distalmost) outer seta about twice as long as the terminal seta; second outer seta widely separated from third outer seta and close to first outer

seta which is located on about the middle of outer edge.

Male (holotype). Body (Fig. 7-A, B) 0.76 mm long, slimmer than the female, semitransparent and faintly tintured with brown. Nauplius eye big (see Discussion). Rostrum, cephalothoracic integument and pleurotergite of each thoracic somite as in the female. A vas deferens extending through thorax toward posterior, reflexed at an anterior portion of the first abdominal somite and again proceeding to posterior in the third thoracic somite, and ending in a spermatophore within the first abdominal somite (see Fig. 8-A). First abdominal somite (Figs 7-C, 8-A, B) forming a small spiniform process on both outer sides of leg 6; posterior hyaline frill finely serrate; at least six rows of spinules attached to dorsal surface, of which the anterior two are interrupted medially and the third is accompanied with two arched rows of

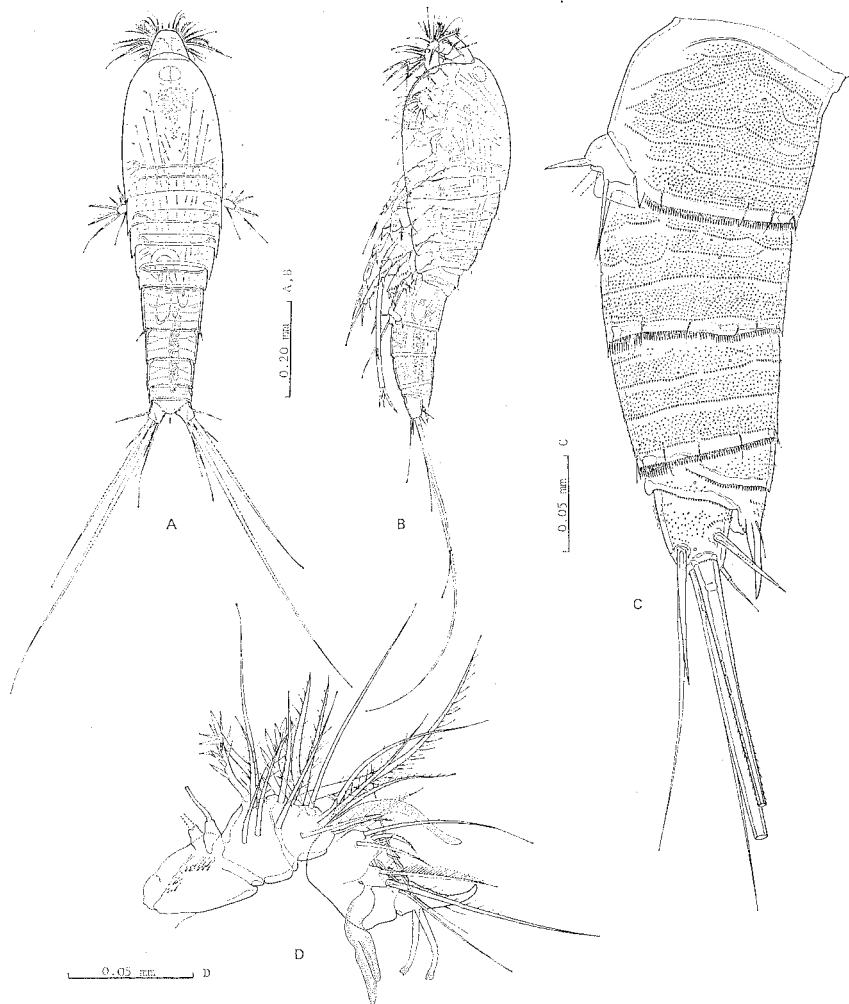


Fig. 7. *Longipedia andamanica nipponica* subsp. nov., holotype male. A. Habitus, dorsal; B. Habitus, lateral; C. Abdomen, lateral; D. Antennule.

spinules and forms together with them a pair of loops of spinules. Second and third (antepenultimate) abdominal somites: ventral teeth of serrate hyaline frill twice as long as dorsal teeth; when viewed from dorsal, each somite ornamented with three rows of spinules, namely, anterior, median and posterior rows—the anterior row consisting of a few arches and branching off into two rows at both dorsolateral portions, and these branches consisting of arches and extending ventrally, the median row encircling the somite, and the posterior row stretched between hairs along the base of hyaline frill; spinular ornamentation of two somites similar, but a dorsal

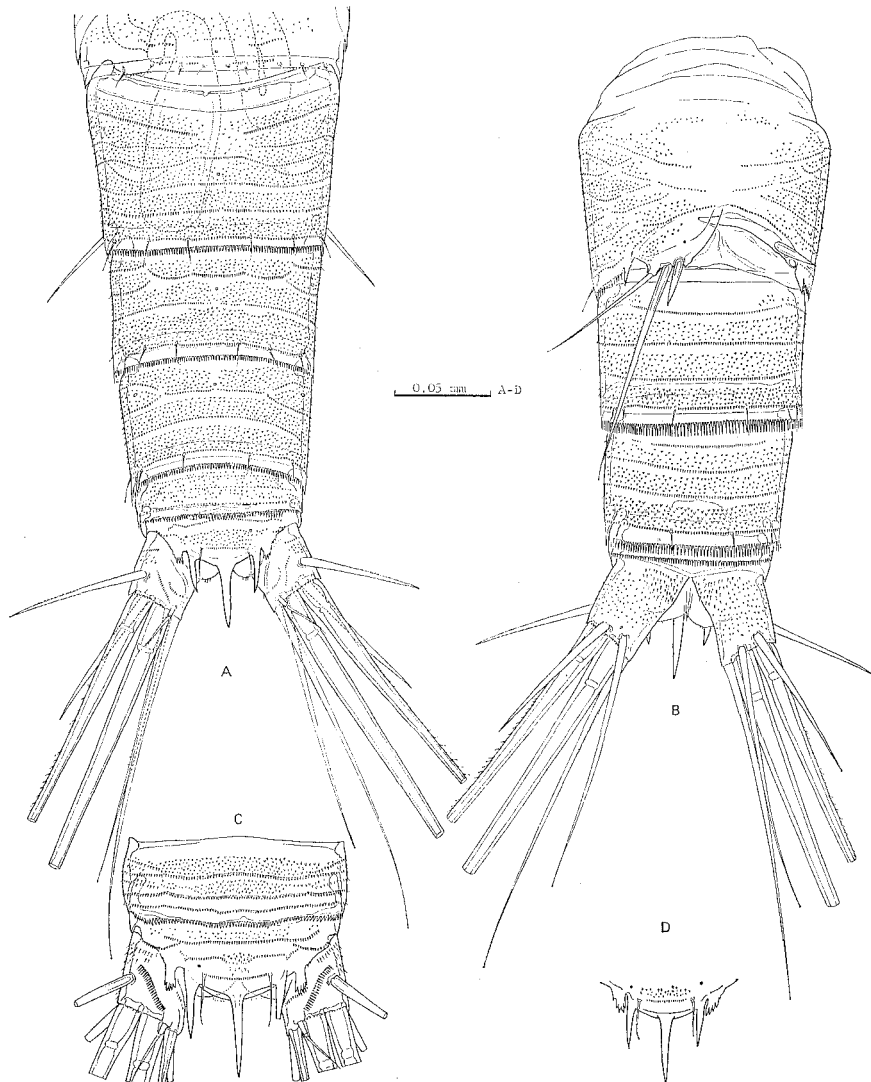


Fig. 8. *Longipedia andamanica nipponica* subsp. nov., A. Abdomen, dorsal (holotype male); B. Abdomen, ventral (holotype male: two setae of leg 6 were broken); C. Posterior two abdominal somites and furcal rami (paratype female); D. Anal operculum (paratype male).

secretory pore placed just behind anterior spinular row in the former somite, and placed in front of anterior spinular row in the latter. Penultimate abdominal somite short, almost invisible from ventral, with no hair; hyaline frill short, finely serrate; spinular rows on dorsal face not so clear than those of the female described (cf. Fig. 8-A and Fig. 2-D). Anal somite: operculum ornamented with three simple processes and two polyfid processes (Fig. 8-A) as in the female—the median process extending a little beyond furcal ramus and about 1.5 times as long as the internal processes; a hair attached near base of each internal process; a row of diminutive spinules stretched between two hairs; a pair of secretory pores each placed on dorsal face somewhat anterior to each external process; diminutive spinules scattered on an area enclosed by the pores and hairs; a transverse row of spinules attached to ventral surface near its posterior limit. Furcal ramus as long as wide when viewed from dorsal, about 1.2 times as long as basal width when viewed from ventral (cf. Fig. 8-A, 8-B); spinules scattered laterally and ventrally, and those on ventral face near inner proximal angle somewhat longer than others; spines and setae as illustrated.

Antennule (Fig. 7-D) chirocer; first segment armed with two processes each terminating in a geniculate seta; a thick aesthetasc arising from antepenultimate segment; penultimate segment swelling, ornamented with a bifurcate aesthetasc; terminal segment forming itself a strong claw with two thin aesthetascs posteriorly. *Antenna* and *oral appendages* as in the female. For detailed structure of mandible, see Fig. 4-G.

Leg 1 as in the female. *Leg 2* (Fig. 9-A). Intercoxal plate, coxa, basis, and exopodite as in the female. First endopodite segment not armed with an unguiform process on outer distal angle of anterior face; a secretory pore placed on anterior face near its inner distal angle which protrudes a little; very small spinules scattered on anterior face near distal end; an oblique row of spinules, which are thicker than those of the female counterpart, attached to anterior face; scattered spinules occurring above the oblique row of spinules; inner seta extending beyond the second endopodite segment, plumose; diminutive spinules scattered on posterior face. Second endopodite segment slimmer than the preceding segment, armed with a hair (? setula) posteriorly together with scattered diminutive spinules; a longitudinal band of diminutive spinules inserted between two areas of scattered diminutive spinules on anterior face. Third endopodite segment 2.5 times as long as the preceding two segments combined, forming itself a spiniform process apically, armed with three apical spines which are subequal in length, and with two inner spines—the first located on a point a little proximal to the middle of inner edge, and the second arising from anterior face near inner edge on a point at about distal two-fifths the length, 1.5 times as long as the first, and directed outwards; anterior face ornamented with a number of diminutive spinules; posterior face sparsely with diminutive spinules. *Leg 3* as in the female. *Leg 4* (Fig. 9-B). Intercoxal plate narrower than the female counterpart, ornamented with corniform protuberances on anterior face and along distal margin; two transverse rows of corniform protuberances on posterior face (not illustrated). Coxa and basis as in the female. Exopodite: inner seta of first

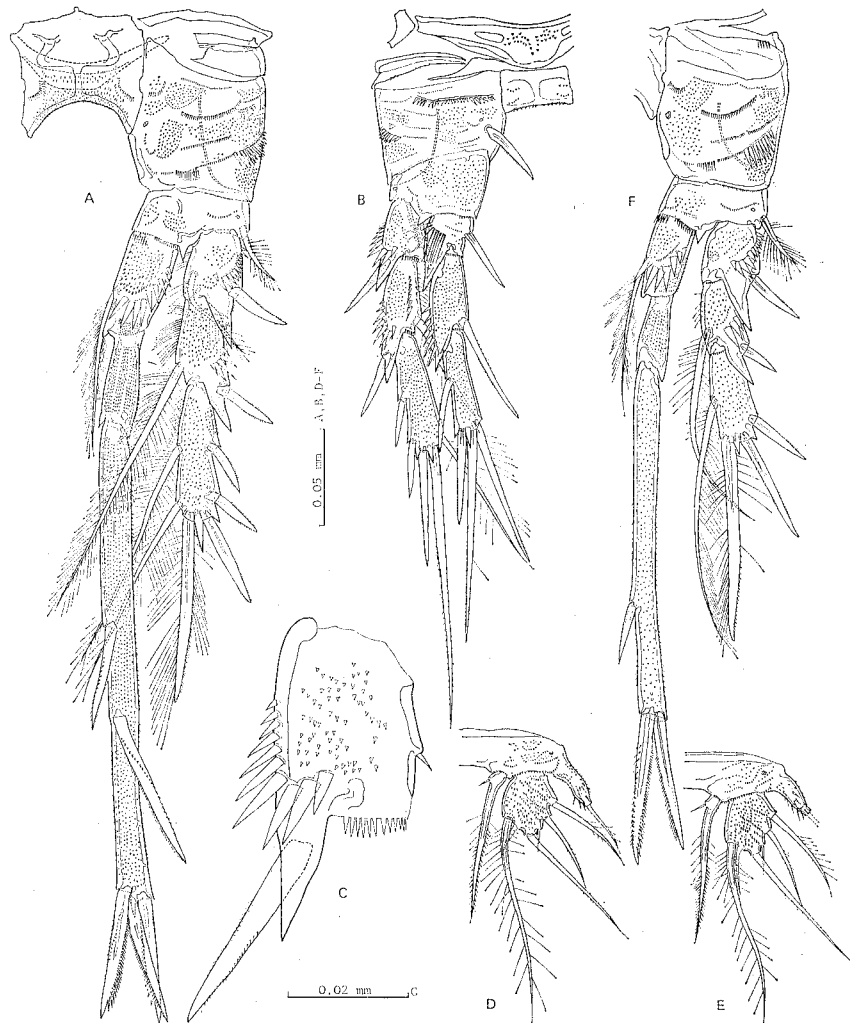


Fig. 9. *Longipedia andamanica nipponica* subsp. nov., A-D, holotype male; E and F, paratype male. A. Leg 2; B. Leg 4; C. First exopodite segment of leg 4; D. Leg 5; E. Leg 5; F. Aberrant left leg 2.

segment dwarf (see Fig. 9-C) as in the female; second segment with three spinules on anterior face between a longitudinal row of seven spinules and hairy inner edge; a spiniform inner seta of second segment furnished with hairs bilaterally; other armatures as illustrated. Endopodite as in the female but the inner apical seta much longer than the female counterpart (see Discussion); no hair on posterior face near the middle of inner edge. The third exopodite segment and apical two endopodite segments of the left leg 4 of this specimen are lost. Leg 5 (Fig. 9-D). Basal segments of two legs represented by a wide common plate; each outer seta arising from a subcylindrical process which is accompanied with a secretory pore near its base. Exopodite segment a little longer than wide, armed with two inner, one

apical, and three outer setae in all—the first inner seta about three times as long as this segment and ornamented with long hairlike spinules bilaterally, the second inner seta very short, the apical seta about twice as long as this segment and with very minute spinules, the third (distal) outer seta extremely dwarf, the second and first outer setae 1.3 and 1.4 times as long as this segment respectively and with fine spinules; a secretory pore placed on anterior face near the middle of inner edge. Endopodite represented by a spinulose seta which is twice as long as exopodite segment and bears a setula on inner edge of its thick basal part. Leg 6 (Fig. 8-B) represented by a plate armed with three setae in all. Two outer setae of the left leg of this specimen are lost.

Variation and abnormality. The body length of the paratype female is almost the same as the allotype. The paratype male is smaller than the holotype male, measures about 0.62 mm long. The anal opercula of these paratypes are shown in Fig. 8-C, D. The leg 5 of the paratype male (Fig. 9-E) well accords with the counterpart of the holotype. The right leg 2 of the paratype male accords with the counterpart of the holotype but the left leg 2 is aberrant (see Fig. 9-F). Both the exopodite and endopodite of this paratype male markedly shorten and are lacking in some spines and setae.

Remarks. *Longipedia andamanica* Wells, 1980 from the South Andaman Islands is easily discernible from all other congeneric species so far known (see Wells, 1980) by its characteristic combination of the following character states: the outer spine of the third endopodite segment of the female leg 2 is located at a level proximal to the proximal inner spine; the third endopodite segment of the male leg 2 has no outer spine; the exopodite of the male leg 5 armed with six setae; the coxa of the leg 2 has no inner spine or seta; the external processes of anal operculum are polyfid. The present specimens from Japan completely accord with *L. andamanica* in the combination of these character states, but the exopodite of the male leg 5 is distinct: In the males from Japan the third (distalmost) outer seta is dwarf and the first inner seta bears long hairlike spinules bilaterally, while the third outer seta is as long as other two outer setae and the first inner seta is naked in the male from the South Andaman Islands. The feature of the first inner seta of these males from Japan resembles that of the counterpart of *L. scotti* Sars, 1903 (see Wells, 1980). In addition to these characteristics in the leg 5, the absence of a reduced unguiform projection on the second endopodite segment of the leg 2 can be enumerated as an important characteristic of the males from Japan.

In contrast to the clear differences between the males of the South Andaman Islands and Japan, it is very difficult to find difference between the females of these two localities. One of the possible differences between them is recognized in the number of hairs on the posterior face of the second endopodite segment of leg 2. The females from the South Andaman Islands have two hairs ("setae" in the sense of Wells, 1980) on the segment in question, while the females from Japan have only

one. Although I do not like to emphasize this difference in the number of hairs on this particular segment, it would be noteworthy that such a difference is recognized also in the counterparts of the males from two localities. The second endopodite segment of the leg 2 of the material from Japan is ornamented with a longitudinal band of diminutive spinules on its anterior face, and this band is well separable from two areas of scattered spinules, each of which is located on both sides of the band. On the other hand, each counterpart of the female and male from the South Andaman Islands illustrated by Wells (op. cit., figs 137 and 153) has not such a band of spinules, instead, it has spinules scattered on its whole surface. In the specimens from Japan a longitudinal row of prominent spinules attaches to the anterior face of each second exopodite segment of the leg 3 and leg 4. However, the counterparts of the specimen illustrated by Wells does not bear such a row of spinules. In my opinion all of these differences are minor, and I think some of them might be ascribable to technical problems. I admit myself it is practically impossible to discriminate the females of two localities by any decisive difference. Considering this very close resemblance between the females of two localities and also dissimilarity between the males, I have designated above the material from Japan as a new subspecies of *L. andamanica* and given it the name *L. andamanica nipponica*. The subspecific name *nipponica* is derived from the Japanese word "Nippon" that means Japan.

Discussion

During the present study I have noticed many characteristics which were overlooked or not described even if they were detected. I can not clearly estimate their taxonomic value for the moment, but I believe it is important to point out them for future taxonomic studies of *Longipedia* species. They are enumerated below, and comments on *L. coronata* Claus, 1863 will be also given because some of the figures and description of this species given by Wells (1980) as the standard for comparison with other species should be emended, though most of his figures and description are accurate. The female specimen from Banyuls-sur-Mer which was the one used to show its leg 5 in a previous paper of mine (Itô, 1981) has been reexamined for this comparative study.

Each coxa of the first four pairs of legs of *L. andamanica nipponica* bears a spiniform projection on its posterior face near outer edge. These projections are seen on the outer edge of the coxa rather than on the posterior face when the legs are undissected (see Fig. 10). It is uncertain whether such a projection attaches to the legs of *L. andamanica andamanica*. I reexamined the specimens of *L. kikuchii* Itô, 1980, and *L. weberi* Scott, 1909, formerly reported by me from Japan (Itô, 1973, 1980), and found that they had a spiniform projection on each coxa of the first four pairs of legs. It is uncertain whether *L. coronata* has such a projection on its first two pairs of legs, because I found a very indistinct protuberance on each coxa of the leg 3 and leg 4 but failed to find any projection on the first two pairs of the legs of the female of *L. coronata* from Banyuls-sur-Mer.



Fig. 10. *Longipedia andamanica nipponica* subsp. nov., paratype female. Spiniform projection of coxa of the leg 4 is indicated by an arrow. Scale: 10 μ m.

L. andamanica nipponica exhibits a clear sexual dimorphism with respect to the length of the inner apical seta of the third endopodite segment of leg 4. Such a sexual dimorphism in the leg 4 has not been previously reported in any other species of *Longipedia*. At least the type material of *L. kikuchii* from south-western Japan does not exhibit such a sexual dimorphism. Certain attention should be paid to the male leg 4 in the future taxonomic studies of *Longipedia* species.

With respect to the rostrum of *L. andamanica andamanica*, Wells (op. ict.) mentions only "rostrum as in *L. coronata*." Since precise figure of the rostrum of *L. coronata* was not given in Wells' paper, I have reexamined the female specimen of *L. coronata* from Banyuls-sur-Mer, and present here a figure of its rostrum (see Fig. 1-F). The rostrum of *L. coronata* is slimmer than that of *L. andamanica nipponica*. Taxonomic value of the rostrum has already been pointed out by me (see Itô, 1980).

In *L. andamanica nipponica* the outer seta of basis of the leg 1 is short and does not extend far beyond the first exopodite segment. Such a characteristic of the outer seta in question is recognized also in *L. andamanica andamanica*, but the counterpart of *L. coronata* is very elongate and extends beyond its second exopodite segment (see Wells, op. cit., fig. 18). In the specimen of *L. coronata* from Banyuls-sur-Mer the seta almost reaches the distal end of the third exopodite segment. Hence, the outer seta of basis of the leg 1 may be useful as a taxonomic character.

The inner seta of the first endopodite segment of leg 3 is not particularly short in two subspecies of *L. andamanica*, but the counterpart of *L. coronata* is markedly dwarf as can be seen in the figure given by Wells (op. cit., fig. 23). The seta is dwarf in my specimen of *L. coronata*, too. Hence, the leg 3 of *L. andamanica* differs from that of *L. coronata*.

According to Wells (op. cit.), each seta of the proximal two segments of the antennal exopodite of *L. coronata* is not plumose. However, the setae of my specimen of *L. coronata* are plumose, and markedly differ from those of *L. andamanica nipponica*. Moreover, those setae of *L. coronata* are not particularly small, while those of *L. andamanica nipponica* are very small.

L. coronata described by Wells bears no seta on the outer edge of basis of the maxillula and bears five setae on the proximal endite of the maxilla, while *L. andamanica nipponica* bears a seta on the former part and six setae on the latter part. My specimen of *L. coronata* accords with *L. andamanica nipponica* in these respects.

In the description of *L. andamanica nipponica*, I emphasized the fact that the nauplius eye was big. As a matter of fact, *L. kikuchii* is very common and *L. weberi* is not particularly rare in sediments deposited in tide pools and shallow-water muddy or sandy bottoms around Shirahama. *L. weberi* and *L. andamanica nipponica* are easily distinguishable from *L. kikuchii* under a dissecting microscope if their body color is carefully checked, because the former two bear brown tinge and the latter not. Moreover, *L. andamanica nipponica* is discernible from *L. weberi* if one pays attention to the size of the nauplius eye. The nauplius eye of *L. andamanica nipponica* is very prominent. Hence, these three sympatric species at Shirahama are readily distinguishable from each other without dissection. Incidentally, I recognize the occurrence of one more *Longipedia* species at Shirahama. This species will be described elsewhere.

References

- Itô, T. 1973. Three species of marine harpacticoid copepods from Amakusa, Kyushu. J. Fac. Sci. Hokkaido Univ., Ser. VI, Zool., 18: 516-531.
- . 1980. Two species of the genus *Longipedia* Claus from Japan, with reference to the taxonomic status of *L. weberi* previously reported from Amakusa, southern Japan. J. Nat. Hist., 14: 17-32.
- . 1981. Descriptions and records of marine harpacticoid copepods from Hokkaido, VIII. J. Fac. Sci. Hokkaido Univ., Ser. VI, Zool., 22: 422-450.
- Wells, J.B.J. 1980. A revision of the genus *Longipedia* Claus (Crustacea: Copepoda: Harpacticoida). Zool. J. Linn. Soc., 70: 103-289.
-